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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 08/636,069
Filing Date: April 22, 1996
Appellant(s): SANDHU ET AL.

Timothy E. Bianchi
For Appellant

EXAMINER'S ANSWER

MAILED
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This is in response to the appeal brief filed 21 June 2004.

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

(2) *Related Appeals and Interferences*

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) *Status of Claims*

The statement of the status of the claims contained in the brief is correct.

(4) *Status of Amendments After Final*

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) *Summary of Invention*

The summary of invention contained in the brief is correct.

(6) *Issues*

Appellant's brief presents arguments --issue numbered "(5)"-- directed to an objection to lack of drawings. This issue relates to petitionable subject matter under 37 CFR 1.181 and not to appealable subject matter. See MPEP § 1002 and § 1201.

Appellant's statement of the issues in the brief is substantially correct. The changes are as follows: It appears that issue labeled "(8)" should read,

"Claim 36 is Unobvious under 35 U.S.C. 103(a) over Roche (U.S. Patent No. 4,581, 248) in view of Hisamune (JP 02-050966) and Considered with Bowen et al. (U.S. Patent No. 4,579,750) and Further in View of Sato et al. (U.S. Patent No. 5,605,867)"

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because the rejection of claim 36 is over Roche and Hisamune and further in view of Sato.

Bowen is used as evidence of inherency only.

Appellant's statement of the remaining issues in the brief is correct.

(7) *Grouping of Claims*

Appellant's statement in the brief that certain claims do not stand or fall together is not agreed with because the claims have not been separately argued. Accordingly, it is believed that the claims stand or fall together to the extent that they are separately argued.

(8) *Claims Appealed*

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) *Prior Art of Record*

US 4,579,750	Bowen et al.	4-1986
US 3,866,083	Datta et al.	2-1975
US 4,581,248	Roche	4-1986
JP 02-050966	Hisamune	2-1990
US 5,112,647	Takabayashi	5-1992
US 5,605,867	Sato et al.	2-1997
EP 0 562 625 A2	Imai et al.	3-1993

Ohring, The Material Science of Thin Films, Academic Press: Boston, 1992, p. 53.

Harrison, The Cassell Dictionary of Physics, Cassell: London, 1988, pp. 44-45.

Atkins and Jones, Chemical Principles, W. H. Freeman and Co.: New York, 1999, pp. 616-620.

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 2, 4-6, 31, 33-36, and 38-54 stand rejected under 35 U.S.C. 112, first

paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Each independent claim, 1, 31, 42, 43, 45-48, and 50-53, recites the limitation that the reaction volume of gases located above the substrate within a chemically reactive distance of the substrate is exposed to a light source “without directly exposing the substrate to the light source.” The only mention in the specification states, “[i]t is not necessary...to illuminate the substrate surface” (p. 7, lines 21-26). As presently written, the amendments to each independent claim still include indirectly exposing the substrate, such as by reflection off of a mirror or a diffraction grating which is *not* supported by the specification. The specification, on the other hand, only supports *not* illuminating the substrate surface, contrary to illuminating the substrate, directly or indirectly. This broadens the scope of “[i]t is not necessary...to illuminate the substrate surface” beyond the metes and bounds of the original specification. Accordingly, the claims as presently written are not supported by the specification because the amended claim language is not in the

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specification and furthermore has no basis from the specification for any indirect illumination of the substrate to the light source.

In this regard, see *New Railhead Manufacturing LLC v. Vermeer Manufacturing Co.*, 63 USPQ2d 1843 (CAFC 2002.) (“Patent for drill bit for horizontal drilling in rock is not entitled to priority date of provisional application, since specification of provisional application must satisfy written description requirement of 35 U.S.C. §112 for invention claimed in non-provisional application, and **since provisional application does not adequately describe, to one of ordinary skill in art, claim limitation at issue**, namely, specific angled relationship between drill bit and its housing.” “Written description requirement of 35 U.S.C. §112 is measured from face of application, and is not satisfied if one of ordinary skill in art must first construct invention in order to ascertain its claimed features; **assertions that inventor was at all times in possession of claimed invention are misdirected if specification fails to convey fact of such possession to one of ordinary skill.**”) In the instant case, one of ordinary skill has not been reasonably apprised that Appellant was in any manner in possession of *indirect* illumination of the substrate surface.

3. Claims 45 and 50 stand rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. Ozone or some oxygen source, critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). Each of claims 45 and 50 deposit a silicon oxide layer, and require illumination to increase the functional atomic oxygen concentration, yet no oxygen source has been provided in the claim. The specification indicates

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that this source is ozone. This feature is critical because the functional atomic oxygen concentration cannot be increased if there is no oxygen source present. Moreover, silicon dioxide --an oxygen-containing material-- cannot be deposited in the absence of an oxygen source.

4. Claims 1, 2, 4-6, 31, 33-36, and 38-54 stand rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a pressure on the order of 0.01 atmosphere (7.6 Torr), does not reasonably provide enablement for a pressure range of 200 to 760 Torr (1 atmosphere). The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims.

Each independent claim, 1, 31, 42, 43, 45-48, and 50-53, recites the limitation that the pressure range is between 200 Torr and 760 Torr. However, the claims require that only the reaction volume is illuminated without illuminating the substrate and that heterogeneous reactions must take place in the reaction volume as opposed to homogeneous reactions. As will be explained below, the specification has not enabled how one of ordinary skill could illuminate only the reaction volume in the pressure range of 200 Torr to 760 Torr while also maintaining only heterogeneous reactions.

US 4,579,750 (Bowen et al.) teaches that in order to reduce the probability of homogeneous reactions and enhance the probability of heterogeneous reactions, the illuminated region must be focused above the substrate and must be absorbed by the reactive gas molecules "within a few mean free path lengths of the gaseous molecules" of the substrate surface. (See Bowen, col. 3, lines 19-43 -- especially lines 32-35.) According to the teaching in Bowen, then,

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in order only to reduce the probability of homogenous reactions from occurring in the reaction volume, the illuminated region (i.e. the reaction volume) must be only a few mean free path lengths thick.

The mean free path of a gas molecule is defined as the distance between collisions with other gas molecules or a surface and is given by the equation

$$\lambda_{\text{mfp}} = 5 \cdot 10^{-3} / P$$

where λ_{mfp} is the mean free path in cm (centimeters) and P is the pressure in Torr. (Ohring, The Material Science of Thin Films, Academic Press: Boston, 1992, p. 53.) Given the presently claimed pressure range of 200 Torr to 760 Torr in each independent claim, the mean free path length is from 0.065 μm to 0.24 μm (65 nm to 240 nm); therefore, the thickness of the illuminated region must be at most about 0.72 μm (720 nm) or 3 times 0.24 μm in order to reduce the probability of homogeneous reactions.

The specification states that an array of lamps, or specifically mercury arc vapor lamps (specification, p. 7, lines 21-29), is used to provide the illumination. Mercury arc vapor lamps emit, *inter alia*, UV wavelengths of 253 nm, 296 nm, and 365 nm (US 3,866,083 Datta et al.; col. 1, lines 10-16)--which is on the order of the thickness of the reaction volume required to reduce the probability of homogeneous reactions. Moreover, lamps provide incoherent light that spreads out from the source, by contrast to a laser that provides coherent light which does not spread out. Accordingly, the light from the mercury arc vapor lamp must be reshaped somehow into a beam thickness on the order of the wavelength of the light being emitted, which cannot happen since it is incoherent light. However, any attempt to reduce the thickness of the incoherent light beam emitted from lamp down to the order of the wavelength of light emitted (by an aperture or lens)

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will necessarily result in diffraction or “spreading out” of the light beam. (See Harrison, The Cassell Dictionary of Physics, Cassell: London, 1988, pp. 44-45-- especially the section entitled “diffraction.”) This then would necessarily result in the light source illuminating the substrate -- contrary to the requirement in the claims.

By contrast, Bowen teaches that a lower pressure, on the order of 7.6 Torr ($\lambda_{\text{mfp}} = 6.5 \mu\text{m}$ or **6500 nm**, several times thicker than that λ_{mfp} at 200 Torr to 760 Torr), is necessary to reduce the probability of homogeneous reactions (Bowen, col. 9, lines 22-36), and also uses a **laser** --a coherent light source-- to attain illumination of **only the thin reaction volume above the surface of the substrate**.

According to the evidence of record, illumination of only the reaction volume without also illuminating the substrate surface at a pressure or **200 Torr to 760 Torr**, while maintaining only heterogeneous reactions, cannot happen. For this reason, the claims are not enabled. Note that the specification states that **1.0 Torr** to 760 Torr are pressures that can be used (p. 7, lines 3 and 4). A coherent light source such as a laser and a pressure of less than about 7.6 Torr, as taught by Bowen, would work. The specification does not provide for use of a coherent light source.

The remaining claims are rejected for depending from the independent claims.

Further in this regard, it has been held, that a patent must be enabled across the full scope of its claims. As the Federal Circuit explained in the *Durel* case:

“[T]o be enabling: the specification of the patent must teach those skilled in the art how to make and use **the full scope of the claimed invention** without undue experimentation.” *Genentech, Inc. v. Novo Nordisk, A/S*. 108 F.3d 1361, 1365 (Fed. Cir. 1997) (emphasis added). If Sylvania had shown that a significant percentage of oxide coatings within the scope of the claims were not enabled what might have been sufficient to prove

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invalidity. See *Atlas Powder*, 750 F.2d at 1576-77 ('[I]f the number of inoperative combinations becomes significant, and in effect, forces one of ordinary skill in the art to experiment unduly in order to practice the claimed invention, the claims might indeed be invalid.').

Durel Corp. v. Osram Sylvania, Inc., 256, F.3d 1298, 1306-07 (Fed. Cir. 2001). See also *Enzo Biochem, Inc. v. Calgene, Inc.*, 188 F.3d 1362, 1374-75 (Fed. Cir. 1999) (patent claims read across a broad range of cell types held not enabled where technology was too unpredictable to ensure that results as to one cell type would hold as to another). In this case, the instant specification has not enable the full scope of the claimed invention, i.e. in the pressure range of 200 Torr to 760 Torr.

Further in regard to the written description requirement, the Court in *In re Ghiron*, 442 F.2d 985, 991, 169 USPQ 723, 727 (CCPA 1971), made clear that if the practice of a method requires a particular apparatus, the application **must provide a sufficient disclosure of the apparatus if the apparatus is not readily available**. (Emphasis added.) See also *In re Gunn*, 537 F.2d 1123, 1128, 190 USPQ 402, 406 (CCPA 1976). No such apparatus is readily available, since the evidence clearly indicates that the claimed method will not work in the presently claimed pressure range of 200 to 760 Torr. Accordingly, because it is incumbent upon Appellant to provide "a sufficient disclosure of the apparatus if the apparatus" as required by precedent and because Appellant has not so done, the written description is deficient and the claims therefore not enabled in the pressure range of 200 Torr to 760 Torr.

5. Claims 1, 2, 4-6, 31, 33-36, and 38-54 stand rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably

convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claims do not have support from the original specification for the limitation “without directly exposing the substrate to the light source.” As indicated in the specification and as admitted by Appellant in Appellant's most recent response, pre-appeal, (filed 30 June 2003) to the most recent Office action (filed 24 March 2003), the specification states only, that “[it] is **not necessary** to illuminate the gas volume in the rest of the CVD chamber or **to illuminate the substrate.**” (Emphasis added.) This is the only mention in the entire disclosure regarding not illuminating the substrate. Of particular importance is that Appellant has already argued that the substrate is not illuminated (Paper filed 15 April 1999, pp. 12-14) in order to overcome the rejection of the claims over the prior art reference, **Hisamune**. In the 15 April 1999 Response beginning on the end of p. 12, Appellant states in pertinent parts in distinguishing the limitation “without directly illuminating the substrate,” from the Hisamune reference,

“Applicant has carefully reviewed the Hisamune reference and is unable to locate a teaching of illuminating gases located within the reaction chamber **without illuminating the substrate surface.**” (Emphasis added.)

“The rejection continues, ‘Hisamune further teaches that the reason for irradiating the inside of the reaction furnace with UV radiation is to induce a photochemical reaction of the gaseous starting materials with ozone (translation, p. 5, lns. 20-21).’ Applicant respectfully submits that this teaching supports Applicant’s argument that Hisamune teaches **illumination of the substrate surface, and not merely illumination within the reaction chamber.**” (Emphasis added.)

“While Hisamune recites ‘irradiating the inside of the reaction furnace,’ Applicant respectfully submits that such a blanket statement neither teaches nor suggests illuminating gases located within the reaction chamber **without illuminating the substrate surface,** given the

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teaching that the irradiation is provided to induce a photochemical reaction.” (Emphasis added.)

In direct contradiction to the above argument, Appellant most recently argued, in the Response filed 30 June 2003, p. 16, first full paragraph, stating,

“Third, the Office implies that the Applicant has asserted ‘illumination of only the reaction volume without also illuminating the substrate surface at a pressure or (sic) 200 Torr to 760 Torr using (sic) while maintaining only heterogeneous reactions cannot happen. For this reason, the claims are not enabled.’ (Office Action at page 6). Applicant again directs the Office to the Specification at page 7, wherein it states ‘[i]t is not necessary to illuminate the gas volume in the rest of the CVD chamber or to illuminate the substrate surface.’ (Specification at page 7, lines 23-24). **This statement does not say the substrate surface is absolutely not illuminated.** Withdrawal of the rejections is respectfully requested.” (Emphasis added.)

As can be seen from the highlighted portions, Appellant argues that the limitation “without directly exposing the substrate surface to the light source” contradictorily means both (1) **not** illuminating the substrate **at all** --in order to overcome the prior art rejection over Hisamune, and (2) that “[t]his statement does **not** say the substrate surface is absolutely **not** illuminated” --to overcome the rejection of the claim over 35 USC 112(1). Examiner respectfully submits that Appellant cannot have the **very same claim limitation mean two different, contradictory things at the same time**. Otherwise there would have been no reason for the Office to have removed several of the previous prior art rejections, because of Appellant's incorporation of the limitation “without directly exposing the substrate surface to the light source” into the claims, beginning with the Amendment filed 15 April 1999. Such would reinstate, *inter alia*, the rejection of the claims over Hisamune alone.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims **31**, **33**, **34**, **38-40**, **42**, **51**, and **52**, stand rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,581,248 (**Roche**) in view of JP 02-050966 (**Hisamune**), and considered with US 4,579,750 (**Bowen et al.**) for a showing of inherency only.

Regarding independent claims **31**, **42**, **51**, and **52**, **Roche** discloses a method of depositing a silicon dioxide layer on a substrate surface comprising,

heating a substrate **22** to a temperature of about 20 °C to 600 °C, with specific examples at 450 °C and 500 °C (col. 7, lines 1-3 and Table I), which overlaps the claimed range of 480 °C to 700 °C;

contacting the substrate **22** with a reaction volume **25** of gas located above the substrate surface within a chemically reactive distance of the substrate (col. 2, lines 17-32; col. 3, lines 35-45; col. 7, lines 64-65), the reaction volume of gas comprising an SiO₂ precursor and an oxygen source -- namely N₂O in a carrier gas of nitrogen --as further limited by instant claims **33** and **34**, (col. 3, lines 53-62; col. 4, line 66 to col. 5, line 38);

illuminating the reaction volume of gas **25** from a high intensity light source -- specifically an ArF laser (col. 5, line 2), without illuminating the substrate (col. 2, lines 17-32) to increase the functional oxygen concentration (col. 5, lines 34-39); and

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subjecting the reaction volume of gas to about 8 Torr during the deposition (col. 5, lines 43-48).

The limitation that the fixed charge in the deposited film is reduced is also inherently met because the instant specification specifically states that it is the atomic oxygen reduces fixed charge. (See instant specification, paragraph bridging pages 7 and 8. See also MPEP 2112.)

The limitation that the reactant gases in the reaction volume undergo heterogeneous reactions rather than homogeneous reactions is met because **Roche** indicates that reactant species are only formed where the laser light is provided (i.e. the region **25**; Roche, col. 7, lines 64-65) and because **Bowen** --who teaches the same photo CVD method as **Roche**-- indicates that irradiating only the region just above the substrate and keeping the pressure around 0.01 atm (7.6 Torr) will reduce the probability of homogeneous reactions in the reaction volume and promote heterogeneous reactions (i.e. reactions between the reactant gases and the substrate surface). (See Bowen, col. 3, lines 20-43.)

Further in this regard, the limitation "the reactant gases in the reaction volume taking part in heterogeneous chemical reactions, rather than homogeneous reactions taking place in the gas volume in the chamber outside the reaction volume" is also necessarily met because the specification and claims have delineated the reaction volume by the existence of the presence of heterogeneous reactions and the absence of homogeneous reactions. The specification indicates homogeneous reactions as those which occur outside "the reaction volume," but does not limit homogeneous reactions from taking place. (See instant specification, p. 7 --especially lines 15-20.)

Roche does not teach a pressure in the range of 200 Torr to 760 Torr or more specifically about 200 Torr --as further limited by instant claim 38.

If it is thought that these pressures are somehow enabled, then this may be a difference. However, it has been held that “claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art.” See *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996). In this case, the instant specification, as noted above, teaches that the pressure range in which the instant invention works is 1.0 Torr to 760 Torr. Accordingly, the specification does not provide evidence of a new and unexpected result for the pressure of 200 Torr or the range of from 200 Torr to 760 Torr, as per the required precedent.

Further regarding the independent claims 31, 42, 51, 52, and claim 39, **Roche** does not teach using ozone as the oxygen source or TEOS as the SiO₂ precursor.

Hisamune teaches a photo-assisted CVD method wherein the TEOS and ozone are used to deposit a SiO₂ film and wherein UV light is used in conjunction with the oxygen source to increase the functional oxygen concentration. (See Hisamune translation pp. 4-7.)

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use ozone and TEOS as the precursors in **Roche**, as taught by **Hisamune**, because one of ordinary skill would recognize that ozone and TEOS work just as well for forming a silicon dioxide film by photo CVD, as taught by **Hisamune**. In this regard, it has been held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious.

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The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 1945) (Claims to a printing ink comprising a solvent having the vapor pressure characteristics of butyl carbitol so that the ink would not dry at room temperature but would dry quickly upon heating were held invalid over a reference teaching a printing ink made with a different solvent that was nonvolatile at room temperature but highly volatile when heated in view of an article which taught the desired boiling point and vapor pressure characteristics of a solvent for printing inks and a catalog teaching the boiling point and vapor pressure characteristics of butyl carbitol. "Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put in the last opening in a jig - saw puzzle." 65 USPQ at 301.). See also *In re LESHIN*, 125 USPQ 416 (CCPA 1960) ("Mere selection of known plastics to make container-dispenser of a type made of plastics prior to the invention, the selection of the plastics being on the basis of suitability for the intended use, would be entirely obvious; and in view of 35 U.S.C. 103 it is a wonder that the point is even mentioned.") (See MPEP 2144.07.)

Then, regarding claims 40 and further regarding independent claims 42 and 52, while **Roche** does not teach a dopant, **Hisamune** teaches the use of trimethylphosphite as the dopant source to form phosphorus-doped SiO₂. (See Hisamune p. 2, p. 6, and p. 7, the sentence before Table 1.)

It would have been obvious for one of ordinary skill in the art, at the time of the invention to add phosphorous dopant, as taught by **Hisamune**, to the SiO₂ film of **Roche**, in order to form a phosphorous-doped silicate glass which is desired in the semiconductor fabrication art, as

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taught by **Hisamune**, which is known to getter contaminant ions such as sodium and moisture and also to reduce the reflow temperature of the glass.

Then further regarding independent claims 51 and 52, **Roche** does not teach the use of a mercury arc vapor lamp. If it is believed that use of this light source is enabled for the pressure range of 200 Torr to 760 Torr, then this may be a difference. **Hisamune** teaches the use of a mercury vapor lamp to illuminate the reaction gas mixture.

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use a mercury vapor lamp, as the light source of **Roche**, as long as it could illuminate the region just above the substrate, because each of **Roche** and **Hisamune** use an ultraviolet light source to provide an increase in atomic oxygen (**Roche**, col. 5, lines 2-20 and 34-39; **Hisamune**, Table 1), such that a mercury arc vapor lamp would be expected to work just as the **Roche** UV laser, since both produce the required UV light.

9. Claim 35 stands rejected under 35 U.S.C. 103(a) as being unpatentable over **Roche** in view of **Hisamune** and considered with **Bowen**, as applied to claim 31 above, and further in view of US 5,112,647 (**Takabayashi**).

Regarding claim 35, the prior art of **Roche** in view of **Hisamune**, as explained above, discloses each of the claimed features except for specifying that helium may be the carrier gas.

Takabayashi teaches a photo CVD method wherein the light is provided just over the surface of the substrate without directly illuminating the substrate and uses He as the carrier gas (col. 5, lines 51-67).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use helium as the carrier gas of **Roche** in view of **Hisamune** because **Roche** uses a carrier gas, and **Takabayashi** teaches the helium is a known carrier gas for photo CVD, such that one of ordinary skill would recognize that helium, being inert would work just as well as another inert gas. Moreover, it has been held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious, as noted above.

10. Claim 36 stands rejected under 35 U.S.C. 103(a) as being unpatentable over **Roche** in view of **Hisamune** and considered with **Bowen**, as applied to claim 31 above, and further in view of US 5,605,867 (**Sato et al.**).

The prior art of **Roche** in view of **Hisamune**, as explained above, discloses each of the claimed features except for specifying the amount of ozone used in the deposition of the SiO₂ film.

Sato teaches a photo CVD method (paragraph bridging cols. 37-38) for depositing SiO₂ for semiconductor fabrication, using TEOS and O₃. **Sato** also teaches that the ozone can be varied over a wide range and teaches that 5% is an exemplary amount (col. 10, lines 13-21).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use 5% ozone in the reactant gas mixture, as taught by **Sato**, in the deposition method of **Roche** in view of **Hisamune**, because **Hisamune** is silent to the amount of ozone, such that one of ordinary skill would necessarily have to determine how much to add, and **Sato** teaches working amounts which would save one of ordinary skill time and money in research and development by using similar quantities already know to work. Moreover, this claim is *prima*

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facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

11. Claims 1, 2, 4-6, 41, **43**, **44**, **45**, **46**, **47**, **48**, 49, **50**, **53**, and 54 stand rejected under 35 U.S.C. 103(a) as being unpatentable over **Roche** in view of **Hisamune** and considered with **Bowen** for inherency only, and further in view of EP 0 562 625 A2 (**Imai et al.**).

The prior art of **Roche** in view of **Hisamune** as explained above, discloses each of the claimed features, except for using at least two dopant sources (instant claims 43 and 53), specifically boron and phosphorous dopants as the two dopant sources (instant claims 1, 44, and 54), the specific dopant sources for boron (instant claims 4, 6, 41, 45), fluorine dopant in the SiO₂ (instant claims 46), fluorine and one dopant source (instant claim 47), fluorine and two additional dopant sources (instant claim 48), fluorine with boron and phosphorous as the two additional dopants (instant claim 49), the specific boron and fluorine sources (instant claim 50).

Imai teaches the benefits of forming a fluorine-doped BPSG (FBPSG) film to reduce the reflow temperature below that of BPSG alone. (See Abstract.) The FBPSG film is produced by a

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CVD method wherein ozone, TEB, TMOP, and FTES are used to form the FBPSG layer. (See section entitled “FIRST EMBODIMENT” beginning on p. 6.)

It would have been obvious for one of ordinary skill in the art, at the time of the invention to add boron, phosphorous, and fluorine, as taught by **Imai**, to the SiO₂ layer of **Roche**, or to add boron and fluorine to the phosphorous-doped SiO₂ of **Roche** in view of **Hisamune**, to reduce the reflow temperature of the SiO₂ layer, as taught to be beneficial in **Imai**.

(11) Response to Argument

Regarding the section entitled,

“The Applicable Law”

The Brief recites case law without applying it to the rejections of the claims and why the claims are allegedly in error based thereupon. Accordingly, there exists nothing for Examiner to rebut.

Regarding the issue entitled,

“(1) Claims 1, 2, 4-6, 31, 33-36, and 38-45 Meet the Requirements under 35 U.S.C. 112, First Paragraph Enablement, for ‘Without Directly Exposing the Substrate to the Light Source’ ”

In addition to the reasons indicated in the rejection of the claims, stated above, in short summary, the claim language “without **directly** exposing the substrate to the light source” is not supported by the specification. It is new matter, broader in scope than contemplated in the disclosure. As quoted from the instant specification in the instant Brief,

“Appellant traverses, since one way to not directly expose the substrate is provided by the specification at page 7, starting at line 21, which states: ‘The high intensity light energy source needs to be applied only to

the reaction volume and can be supplied by an array of lamps arranged to give uniform illumination of the said volume. It is **not necessary** to illuminate the gas volume in the rest of the CVD chamber or **to illuminate the substrate surface.**' " (Emphasis added.)

First, Examiner respectfully submits that the absence of necessity to illuminate the substrate surface does not provide written description support for the claim limitation, "without **directly** exposing the substrate to the light source," because **indirect** exposure is not contemplated in the specification at all. The scant specification teaches only **direct** illumination by a "high intensity light source," the **preferred** light source being "an array of mercury arc vapor lamps positioned to uniformly **illuminate the reaction surface of the substrate**" (instant specification, p. 6, lines 2-6; emphasis added). Neither the preferred embodiment nor the statement that "It is not necessary to illuminate ... the substrate surface" can be considered a disclosure of **indirectly** exposing the substrate to light.

Note further in this regard that Appellant tried to amend the specification --only after being provided prior art that read on the claims-- from "illuminate the reaction surface of the substrate" to "illuminate the reaction **volume of gas above** the surface of the substrate," but was denied entry of this statement as being drawn to new matter. For verification, see the Amendment filed 1 December 1997 wherein Appellant introduced the amendment to the specification. See Action filed 26 October 1998 wherein the specification was objected to for introduction of new matter. See the Amendment filed 15 April 1999 wherein Appellant removed the amendment to the specification. Accordingly, Appellant was not in "possession of the claimed invention" as required. Enablement requires "possession of the claimed invention," rather than speculation regarding limitations "not excluded" by statements in the specification, as presently argued in the Brief.

Precedent supports this position. See *In re Barker*, 559 F.2d 588, 591, 194 USPQ 470, 472 (CCPA 1977) (a specification may be sufficient to enable one skilled in the art to make and use the invention, but **still fail to comply with the written description requirement**). See also *In re DiLeone*, 436 F.2d 1404, 1405, 168 USPQ 592, 593 (CCPA 1971). To meet the written description requirement, an applicant's **specification must** reasonably convey to those skilled in the art that the **applicant was in possession** of the claimed invention as of the date of invention. *Regents of the University of California v. Eli Lilly & Co.*, 119 F.3d 1559, 1568, 43 USPQ2d 1398, 1405 (Fed. Cir. 1997); *Hyatt v. Boone*, 146 F.3d 1348, 1354, 47 USPQ2d 1128, 1132 (Fed. Cir. 1998). See also *New Railhead Manufacturing LLC v. Vermeer Manufacturing Co.*, 63 USPQ2d 1843 (CAFC 2002), as cited above in the rejection of these claims under 35 USC 112(1). Accordingly, failure to mention indirect illumination of the substrate surface can hardly be taken as a showing of possession or contemplation of this claim feature.

Second, Examiner respectfully submits, not illuminating the substrate surface, is **not** a way to **indirectly** expose the substrate surface to light, as argued by Appellant. Indirect illumination is still illumination, and therefore contradicts **not** illuminating the substrate surface, as stated in the specification.

Third, and as shown by excerpts from Appellant's previous arguments of record, provided above in the rejection of the claims under 35 USC 112(1), Appellant contradicts himself regarding the meaning of the claim limitation "without directly exposing the substrate surface to the light source." The specification states only, that "[it] is **not necessary** to illuminate the gas volume in the rest of the CVD chamber or **to illuminate the substrate**." (Emphasis added.) This is the only mention in the entire disclosure regarding not illuminating the substrate. Of particular

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importance is that Appellant has already argued that the substrate is **not** illuminated (Paper filed 15 April 1999, pp. 12-14) in order to overcome the rejection of the claims over the prior art reference, **Hisamune**. In the 15 April 1999 Response beginning at the end of p. 12, Appellant states in pertinent parts in distinguishing the limitation “without directly exposing the substrate surface to the light source,” from the Hisamune reference,

“Applicant has carefully reviewed the Hisamune reference and is unable to locate a teaching of illuminating gases located within the reaction chamber **without illuminating the substrate surface**.” (Emphasis added.)

“The rejection continues, ‘Hisamune further teaches that the reason for irradiating the inside of the reaction furnace with UV radiation is to induce a photochemical reaction of the gaseous starting materials with ozone (translation, p. 5, lns. 20-21).’ Applicant respectfully submits that this teaching supports Applicant’s argument that Hisamune teaches **illumination of the substrate surface, and not merely illumination within the reaction chamber**.” (Emphasis added.)

“While Hisamune recites ‘irradiating the inside of the reaction furnace,’ Applicant respectfully submits that such a blanket statement neither teaches nor suggests illuminating gases located within the reaction chamber **without illuminating the substrate surface**, given the teaching that the irradiation is provided to induce a photochemical reaction.” (Emphasis added.)

In direct contradiction to the above argument, Appellant most recently argued, in the Response filed 30 June 2003, p. 16, first full paragraph, stating,

“Third, the Office implies that the Applicant has asserted ‘illumination of only the reaction volume without also illuminating the substrate surface at a pressure or (sic) 200 Torr to 760 Torr using (sic) while maintaining only heterogeneous reactions cannot happen. For this reason, the claims are not enabled.’ (Office Action at page 6). Applicant again directs the Office to the Specification at page 7, wherein it states ‘[i]t is not necessary to illuminate the gas volume in the rest of the CVD chamber or to illuminate the substrate surface.’ (Specification at page 7, lines 23-24). **This statement does not say the substrate surface is**

absolutely not illuminated. Withdrawal of the rejections is respectfully requested.” (Emphasis added.)

This argument is present in the instant Brief, albeit in different words. As can be seen from the highlighted portions, Appellant argues that the limitation “without directly exposing the substrate surface to the light source” contradictorily means both (1) **not** illuminating the substrate **at all** -- in order to overcome the prior art rejection over Hisamune, and (2) that “[t]his statement does **not** say the substrate surface is absolutely **not** illuminated” --to overcome the rejection of the claim over 35 USC 112(1). Examiner respectfully submits that the **very same claim limitation cannot mean two different, contradictory things at the same time**. Otherwise there would have been no reason for the Office to have removed several of the previous prior art rejections, because of Appellant's incorporation of the limitation “without directly exposing the substrate surface to the light source” into the claims, beginning with the Amendment filed 15 April 1999. Such would reinstate, *inter alia*, the rejection of the claims over Hisamune alone.

For these reasons the rejection of the claims 1, 2, 4-6, 31, 33-36, and 38-45 under 35 USC 112(1) stands.

**Regarding the issue entitled,
“(2) Claims 45 and 50 Meet the Requirements under 35 U.S.C. 112,
First Paragraph Enablement”**

Examiner rebuts the arguments by reference to the rejection of the claims above. In summary, according to the instant specification, atomic oxygen is generated by illumination of some photolabile oxygen source --particularly ozone, O₃-- decomposing under UV illumination to produce atomic oxygen (O₃ + hν → O₂ + O). Absent this critical feature, the limitation of “illuminating the reaction volume of gas from a light source...to increase the functional atomic

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oxygen concentration” cannot happen. Accordingly, the photolabile oxygen source is a critical feature.

The use of the open-ended language “comprising,” while admittedly not excluding the photolabile oxygen source, does not equal the recitation of the critical feature in the claims. Atomic oxygen cannot be materialized from nowhere but instead must be provided for in the reaction volume. Whether or not one of ordinary skill knows that the photolabile oxygen source is required is not the equivalent of a recitation in the claim of the element required to give atomic oxygen --namely the photolabile oxygen **source**. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

For these reasons the rejection of the claims 45 and 50 under 35 USC 112(1) stands.

Regarding the issue entitled

“(3) Claims 1, 2, 4-6, 31, 33-36, and 38-45

Meet the Requirements under 35 U.S.C. 112, First Paragraph

Enablement, over the Pressure Range Rejection of Paragraph 4 of the Final Office Action”

First, Examiner fully explained and provided evidence in the Office action filed 24 March 2003, why the invention will not operate in the claimed pressure range of 200 Torr to 760 Torr. The somewhat lengthy explanation of the evidence is repeated above, in the rejection of the claims and is omitted here for brevity. Appellant rebutted these arguments in the Response filed 30 June 2003, but the arguments were found unpersuasive for reasons indicated in the Office action filed 10 September 2003. Examiner stands by the rejection and rebuttal of Appellant's arguments regarding the 35 USC 112(1) scope of enablement issue and incorporates Examiner's

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rejection of the claims and the rebuttal to Appellant's arguments in the Office action herein by reference in their entirety.

Second, Examiner respectfully submits that Appellant's arguments are defective for failing to address how the first paragraph of 35 U.S.C. 112 is complied with, including how the specification enables any person skilled in the art to make and use the subject matter defined by each of the rejected claims --specifically in the claimed pressure range of 200 Torr to 760 Torr (standard atmospheric pressure)-- in light of the evidence of record showing that the method will not operate as claimed. (See MPEP 1206.) Instead, Appellant suggests the Bowen reference is inapplicable because of a purported difference in the instant claim condition of temperature (480 °C to 700 °C) and the *un-indicated* temperatures used in the Bowen reference. Examiner respectfully disagrees.

In this regard, Appellant argues that because Bowen is purportedly not heating the substrates to the same temperature as in the instant claims, that the Bowen reference is inapplicable as evidence that the instant claims fail to work in the presently claimed pressure range of 200 Torr to 760 Torr (1 atmosphere). Examiner respectfully disagrees. Bowen is very clear regarding the effect of temperature. Bowen states at col. 2, lines 54-60,

“Homogeneous gas phase nucleation is suppressed ... by reducing the kinetics by **decreasing the molecular collisions** between reaction product molecules (atoms).” (Emphasis added.)

As pointed out in the basic chemistry textbook of Atkins and Jones, Chemical Principles, W. H. Freeman and Co.: New York, 1999, p. 617 (a reference provided to Appellant along with the Office action made final, filed 10 September 2003),

“The mean speed of the molecules increases with temperature, so the collision rate increases too.” (Emphasis added.)

Therefore, higher temperatures **increase collision frequency** amongst molecules in the gas phase, and consequently **increase homogeneous reactions**, as taught above by Bowen, contrary to the instant claims which state,

“reactant gases in the reaction volume taking part in heterogeneous chemical reactions rather than in homogeneous reactions taking place in the chamber outside of the reaction volume.”

With all of this evidence in mind, the Brief's argument that higher substrate temperatures are used in the instant claims than in Bowen, only serves as further evidence that the instant claims are **not enabled at elevated temperatures** because elevated temperatures lead to homogeneous --rather than heterogeneous-- reactions in the reaction volume by increasing the number of collisions among the reactant gases. Depending upon the interpretation of the claim limitation, then, at the higher temperatures which Appellant has argued exist in the instant claims, either (1) the reaction volume becomes even more narrow at elevated temperature, making it even more difficult to illuminate only the region above the substrate surface, or (2) heterogeneous reactions will take place in the “reaction volume” contrary to the claim language.

The Brief argues on p. 11, second paragraph that Examiner dismissed the effect of temperature on the mean free path. Examiner respectfully disagrees. Examiner expressly pointed out that the temperature has no impact. This is not a dismissal, it is a treatment of Appellant's argument at the time. The temperature, in fact, does not affect the mean free path for a fixed number of molecules in a fixed volume. Such a situation exists in flowing a reactant at a fixed pressure into the reaction chamber. Regarding the effect of temperature on the mean free path, while the temperature increases the kinetic energy, speed, and consequently the collision

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frequency, as taught by Bowen and Atkins, the distance between the molecules is fixed by the volume in which the fixed number of gas molecules are located. A gas expands to the limits of the reaction chamber. Once the number is defined, however, the mean free path is fixed. As stated in the Ohring reference cited in the rejection, at p. 52, penultimate paragraph, at the first sentence,

“The mean distance traveled by molecules between collisions, called the mean-free path λ_{mfp} , is an important property of the gas **that depends on the pressure.**” (Emphasis added.)

The pressure determines or fixes or is a measure of the number of gaseous atoms or molecules in the fixed volume at a given temperature. For the Bowen system and the system of the instant application, the reactants are fed into a fixed volume at a fixed temperature and pressure, accordingly the number of molecules in the reaction chamber is fixed by these parameters; therefore, the distance between the molecules is fixed. Accordingly, the mean free path is constant for a fixed number of gas molecules in a fixed volume.

In this regard, the Brief postulates at p. 11, second paragraph,

“Thus, it is respectfully submitted that large temperature gradients have a physics which is not easily determinable by equations provided for processes at equilibrium.”

Examiner respectfully disagrees. It is in fact rather simple since the temperature does not significantly affect the mean free path once the number of molecules is fixed. Temperature, instead increases the collision frequency and thereby increases the degree of homogeneous gas phase reactions, contrary to the instant claims.

Further in regard, Bowen shows the mean free path critically impacts the degree of undesired homogeneous reactions in the reaction volume (the illuminated portion of the gases in

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the reaction chamber). Yet Appellant states that it is "not easily determinable." It is unclear how Appellant can be in possession of the claimed invention, if Appellant has failed to determine the impact of the mean free path as a function of, *inter alia*, temperature. If the temperature is so critical as to show the Bowen reference inapplicable --even in light of Bowen pointing out that higher temperatures only increase undesired homogeneous reactions-- Appellant must be aware how the instantly claimed method is impacted by temperature. Examiner respectfully submits that that which Appellant has failed to address is revealing of that which Appellant fails to possess.

Beginning on p. 11, Appellant argues that the reference must be considered as a whole, citing MPEP 2141.02. Examiner respectfully submits that this argument is misplaced. This requirement is for the *Graham v. Deere* analysis used in rejections under 35 USC 103(a). It does not pertain to rejections regarding scope of enablement. Nonetheless, the Bowen reference --as a whole-- provides evidence that the instant claim limitations, cannot simultaneously exist in the pressure range of 200 to 760 Torr. Appellant's arguments regarding the temperature only serve to bolster the position that heated substrates would only increase homogeneous reactions, contrary to the claims.

While Appellant's arguments regarding the potential effect of an unproven temperature gradient are noted, Appellant merely speculates as to the impact on the mean free path, without pointing out why the underlying physics explained in Bowen are inoperable. Examiner respectfully submits that a sound basis exists, as shown by the evidence of record, that the instant claims are not enabled in the pressure range of 200 Torr to 760 Torr. Appellant has not

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demonstrated how the instant invention could work --*as presently claimed*-- in the pressure range of 200 Torr to 760 Torr.

Finally, the Brief presents the argument that the Office action relies upon Bowen to establish obviousness. This observation is directly in error. As is clear from the rejections above, Bowen is used for a **showing of inherency only** and is not used as a modifying reference. Bowen is used to show that because the CVD parameters of (1) illumination of only the reaction volume over the substrate surface and (2) the pressure range are the same as in Roche, that the reactant gases will necessarily undergo heterogeneous reactions, rather than homogeneous, reactions, thereby demonstrating that Roche inherently reads on that particular claim limitation. Appellant's assertion that the Bowen reference is used to establish obviousness disregards the actual purpose for which Bowen is provided for the rejections under 35 USC 103(a). Examiner further submits that the use of Bowen as evidence relating to non-enablement under 35 USC 112(1) has absolutely no bearing on its use for a showing of inherency. Moreover, Examiner respectfully disagrees that Appellant has in any valid manner shown the Bowen reference to be improper, for reasons already of record.

For these reasons, Appellant's arguments are not considered persuasive.

Regarding the issue entitled

“(4) Claims 1, 2, 4-6, 31, 33-36, and 38-45 Meet the Requirements under 35 U.S.C. 112, First Paragraph Written Description, over Paragraph 4 of the Final Office Action”

The Brief refers to previous arguments under issues numbered (1) and (2) to support the rejections. Examiner respectfully disagrees for reasons presented in the rejection of the claims

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above and for the additional reasons presented in addressing issues labeled (1) and (3) above, which are incorporated herein by reference, but omitted as repetitious.

Regarding the issue entitled,

“(6) Claims 31, 33, 34, 38-40, 42, and 52 are Unobvious under 35 U.S.C. 103(a) over Roche (U.S. Patent No. 4,581, 248) in view of Hisamune (JP 02-050966) and Considered with Bowen et al. (U.S. Patent No. 4,579,750) for a showing of Inherency”

The Brief initially argues,

“It is respectfully submitted that none of the cited patents, alone or in combination, provide the recited subject matter. The claims recite heating the substrate and pressure limitations which the cited references teach away from or fail to mention. For instance, Appellant repeats the discussion above in Section (3) concerning the removal of Bowen for teaching away from a heated substrate and how it is improperly used for rejection of the recited subject matter. Consequently, it is respectfully believed that Bowen is improperly combined in all of the pending rejections under 35 U.S.C. 103 and should be withdrawn.”

First, as stated above, the rejection is not over Bowen. Second, Bowen is used for a showing of **inherency only**. Third, Bowen in no manner teaches away from heating, as incorrectly argued in the Brief above. Fourth, by contradiction to the Brief's above argument, **the Brief admits that Bowen heats the substrate and gases** at page 10, last paragraph of the instant Brief. Fifth, neither Roche nor Hisamune can be properly said to teach away from heating the substrate, since Roche uses a temperatures from 200 °C to 600 °C (Roche, col. 7, Tables I and II), and Hisamune uses temperatures of 400 °C (Hisamune p. 6, last paragraph). The Brief's arguments are clearly in error for each of these reasons. Accordingly, the argument is not found persuasive.

Additionally, while it is acknowledged that Roche teaches 8 Torr, the instant specification indicates that the method works in a pressure range of 1.0 Torr to 760 Torr and fails

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to provide evidence of unexpected results for the pressure range of 200 Torr to 760 Torr, in addition to failing to show that the method will operate as claimed in the presently claimed pressure range. In this regard, it has been held that “claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art.” See *In re Huang*, 40 USPQ2d 1685, 1688(Fed. Cir. 1996). Accordingly, the instant specification teaches away from the existence of any such results since the specification indicates that the method works to deposit SiO₂ over the entire range of 1.0 to 760 Torr. For these reasons and the reasons presented establishing that the instant method will not operate as claimed in the pressure range claimed, incorporating the pressure range cannot be held to be novel and non-obvious.

Regarding the inherency established by Bowen, the Brief presents the argument,

“Because the Final Office Action's assertion of inherency lacks the requisite details about how the Final Office Action is relying on inherency, it is believed improper.”

Examiner respectfully but emphatically disagrees. By contrast to the Brief's accusation, as quoted from the non-final Office action (filed 24 March 2003) and the final Office action (filed 10 September 2003), and as repeated above in this Examiner's Answer,

“The limitation that the reactant gases in the reaction volume undergo heterogeneous reactions rather than homogeneous reactions is met because **Roche** indicates that reactant species are only formed where the laser light is provided (i.e. the region **25**; Roche, col. 7, lines 64-65) and because **Bowen** --who teaches the same photo CVD method as **Roche**-- indicates that irradiating the only region just above the substrate and keeping the pressure around 0.01 atm (7.6 Torr) will reduce the probability of homogeneous reactions in the reaction volume and promote heterogeneous reactions (i.e. reactions between the reactant gases and the substrate surface). (See Bowen, col. 3, lines 20-43.)”

Clearly, the rejection indicates the reason for which the Bowen reference is relied upon for showing inherency.

Finally under this issue, the Brief presents the argument,

“Appellant respectfully submits that the rejection fails to provide adequate motivation or suggestion to combine the references, and that such motivation is unlikely in light of the teachings of Bowen which teach away from the present subject matter. Appellant respectfully requests that the Board reverse the rejections.”

First, as has been already established, Bowen does not teach away from Roche and Hisamune. Second, Bowen is used for a showing of fact, of inherency, existing in the Roche reference and is applicable for reasons of record. Accordingly, Bowen is not “combined” with Roche and Hisamune. While there exists no teaching away in Bowen from either of Roche and Hisamune, assuming *arguendo* there were, the point is moot since Bowen is used only for a showing of inherency.

Finally, in response to the Brief’s argument that there is no suggestion to combine the references, Examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the reason is that Roche and Hisamune are both using photo CVD to deposit, *inter alia*, SiO₂ on silicon substrates, wherein UV light is used to decompose photolabile sources of atomic oxygen to react with silicon precursors. Accordingly, the materials used are obvious variants in the absence of some unexpected result in using the materials. Note, that it has been

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held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. (See MPEP 2144.07.)

Regarding the issue entitled,

“(7) Claim 35 is Unobvious under 35 U.S.C. 103(a) over Roche (U.S. Patent No. 4,581, 248) in view of Hisamune (JP 02-050966) and Considered with Bowen et al. (U.S. Patent No. 4,579,750) and Further in View of Takabayashi (U.S. Patent No. 5,112,647)”

The arguments provided in the Brief fail to teach why one of ordinary skill would not use a *notoriously* well known carrier gas, helium (He), used as in the photo-assisted CVD method of Takabayashi, as the carrier gas in Roche. Note again, that it has been held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. Inert gases are specifically used as carrier gases because they are inert. The Brief and the instant disclosure fail to provide reasons why helium carrier somehow contributes a novel, non-obvious feature to photo-assisted CVD.

Regarding the issue entitled,

“(8) Claim 36 is Unobvious under 35 U.S.C. 103(a) over Roche (U.S. Patent No. 4,581, 248) in view of Hisamune (JP 02-050966) and Considered with Bowen et al. (U.S. Patent No. 4,579,750) [and Further in View of Sato et al. (U.S. Patent No. 5,605,867)]”

The Brief again incorrectly suggests that Bowen is used for something other than inherency. The rejection is over Roche in view of Hisamune and further in view of Sato. Sato teaches known amounts of ozone in photo-assisted CVD of SiO₂. Accordingly, one of ordinary skill would be motivated to save time and money in research and development re-discovering ozone concentrations already known to work. Moreover, it is merely routine optimization in the

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absence of some unexpected result for the claimed ozone concentration. No such evidence has been provided or presently exists of record.

Regarding the issue entitled,


“(9) Claims 1, 2, 4-6, 41, 43-50, 53, and 54 are Unobvious under 35 U.S.C. 103(a) over Roche (U.S. Patent No. 4,581, 248) in view of Hisamune (JP 02-050966) and Considered with Bowen et al. (U.S. Patent No. 4,579,750) and Further in View of Imai et al. (EP 0 562 625 A2)”

The Brief yet again incorrectly suggests that Bowen is used for something other than inherency. The rejection is over Roche in view of Hisamune and further in view of Imai. Imai is used to show the benefits of using the dopants to reduce the reflow temperature of SiO₂. The combination is considered proper for reasons indicated in the rejection.

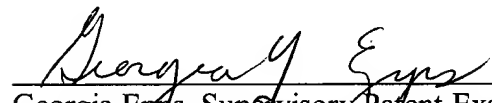
For the above reasons, it is believed that the rejections should be sustained.

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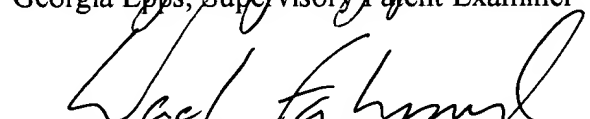
Respectfully submitted,


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August 30, 2004

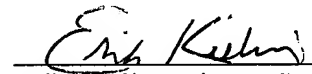
Conferees at Appeal Conference held 26 August 2004:


Georgia Epps, Supervisory Patent Examiner

8/31/04
Date


Wael Fahmy, Supervisory Patent Examiner

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